BOOK REVIEW

FLEISSNER, Günther and Gerta FLEISSNER. 1988. Efferent control of visual sensitivity in arthropod eyes: with emphasis on circadian rhythms. Volume 5 of "Information Processing in Animals", Akademie der Wissenschaften und der Literature, Mainz. Edited by Martin Lindauer. Gustav Fisher Verlag, Stuttgart. 67 pages, 20 text figures. Price $22.50 US ISBN 0895-74253-5.

The Fleissners begin the Introduction with a quotation by Horridge and Blest "... if you ... go home every day at 5 o'clock, you might be missing something". This is very appropriate, because this volume not only deals with what happens to arthropod eyes during the day, but also at the onset of darkness and during the night.

Chapter one starts with a brief historical perspective, going back to Exner's classic work. There are then succinct accounts of photoreceptor adaptations where it is pointed out that arthropod eyes have a number of interlocking adaptational mechanisms, by which they adapt their sensitivity to changing incident light intensity. The endogenous circadian control of photosensitivity protects the eyes from damage by incident light as well as providing necessary sensitivity to that light.

Chapter two deals with the different types of efferent circadian control and there are numerous figures to illustrate the types of circadian rhythms that have been observed, such as obligatory and facultative circadian adaptation. A brief consideration is given to non-circadian adaptation.

I found chapter three about the actual mechanisms of the adaptations to be fascinating. The Fleissners show in detail, with good figures, some quite astonishing, changes that the eye components undergo. Not only is there the well known pigment movement within the pigment cells, but as well extensive changes in the shape and organization of the the cells, including the receptor cells and also the crystalline cone and its tract. This rather detailed chapter has a summary, which, oddly, is missing from the previous two chapters.

The fourth chapter, which is short, deals with the details of the transmission of the efferent circadian signal to the eye. There appear to be three mechanisms, hormonal, neural and metabolic. In chelicerates, neurosecretory fibers appear to have been well demonstrated. This is not so clear in insects, but the Fleissners suggest that such is likely. In crustaceans, hormonal control seems to be accepted generally , but recently neurosecretory fibres have been found. Various types of anesthesia (ie. low temperature, O2 depletion, etc.) always produce a light adapted state of pigment distribution in eyes, but the Fleissners suggest that changes in light sensitivity due to changes in metabolism only provide boundaries within which the more sophisticated modes operate. Again they provide a short summary.

The efferent control system is best understood for scorpions, in particular Androctonus australis, so in chapter 5 the use this animal as a model to explore the arrangement and physiology of the "efferent neurosecretory fibers" (ENSF). They

hypothesize, that the ENSF system acts as a computer system-bus, in which both data and control commands are transferred. This is a particularly well written section because it is made very clear what information is still needed to substantiate the hypothesis. Then they ask the question whether other arthropods have an efferent system (ENSF) of the Scorpion-type. Even though they admit that a general scheme for arthropods based on the scorpion model is premature, they provide a basic framework for such an arrangement. The accompanying figure which outlines the hypothesis is excellent.

There is then a short conclusion and perspective. Of particular importance here is a brief consideration of experimental procedures, in which the Fleissners warn of some pitfalls associated with experiments on circadian-mediated visual adaptations.

I have not seen the other volumes in this series, so do not know at what kind of audience they are aimed. However, this volume would be excellent for advanced undergraduate teaching, or as I found, a fine refresher course of an area in which I am only peripherally involved. If this Volume 5 by Günther and Gerta Fleissner is typical for this series it would be well worth investigating the other volumes.

The writing is succinct and figures are clear. Some captions required a double reading to comprehend the full detail available in the figure, but still they would be excellent for teaching. I liked particularly those showing the considerable cellular and pigment reorganization of the retinulae during dark and light adaptations. The text is authoritative, as indeed it should be, considering the extensive work the Fleissners have done in this area. But of importance, if this volume is to be used for teaching, is the manner in which the hypotheses are proposed. It is clear that not all the information is in, and possible ways of obtaining the required information are hinted at. This is an excellent way to pique a student's curiosity.

The work appears to be up-to-date with more than 200 literature citations, a number of which are for 1988 and even a few for work-in-press.

There are a few typographical errors. My main concern with this volume has nothing to do with the contents, but with the binding. It is a cheap glue job and my copy has loose pages already after even just a few openings. A pity, considering the high quality of the contents. I hope Fisher Verlag, the publisher, will take note.

However, the Fleissners make their point well- much is missed if you go home at five o'clock.

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